NEW TRENDS IN THE CREATION AND MANAGEMENT OF SOCIAL ENTERPRISES:

STUDY CASES (II)

Coordinator: Teresa Mª Monllau

The case of Coronavirus Makers: talent and resources at the service of the community

Authors

Lizbeth Arroyo

Business Department. University of Barcelona.

Esther Hormiga

Business Department. University of Barcelona.

Jaume Valls

Business Department. University of Barcelona.

MINISTERIO DE TRABAJO Y ECONOMÍA SOCIAL
SEPE
Generalitat de Catalunya
Departament de Treball, Afers Socials i Famílies
economia social
YUNUS SOCIAL BUSINESS CENTRE
upf. Universitat Pompeu Fabra Barcelona

OBJECTIVE OF THE CASE

This case deals with the success story of Coronavirus Makers, an initiative that has a strong social component. The case shows to the reader how it was possible and how it was developed, what were the main organizational challenges as well as what are some of the important challenges for the future. The case can help the reader reflect on the development of the network in the context of the Covid-19. Additionally, it provides elements of theoretical reflection on the innovation communities, their characteristics and the behaviour and motivations of their members.

1. INTRODUCTION

After the first week of March 2020, the media in Spain begin to talk about a possible collapse of healthcare due to the Epidemic of Covid-19 and the imminent lack of resources of the health system in the face of the quick increase in admissions to the Intensive Care Units (ICUs) of hospitals. One particularly worrying issue, at the time, was the lack of Breathing aids devices. Concern among the medical community, scientists and public institutions was growing. On March 12, the acceleration of the process was confirmed, there were 84 deaths and almost 3,000 infected. In that second week of March a group of doctors, engineers, entrepreneurs and makers begins to organize through social networks. It is the beginning of one of the largest projects of collective innovation in Spain, the Coronavirus Makers community.

With the support of foundations, institutions and companies, the collaborative network Coronavirus Makers integrated more than 20,000 researchers, developers and engineers, who put their knowledge and resources altruistically at the service of the community to solve one of the main problems faced by healthcare at the time, the shortage of sanitary material in the face of the increase in cases due to Covid-19. It was to provide a certain type of

equipment that was feasible for the manufacture "maker": visors, masks, solenoid valve or breathing aids devices were some of the designs and prototypes that the members of the network were able to generate in a very short period of time.

2. MAKERS AND COMMUNITIES OF INNOVATION: THE GESTATION PERIOD OF CORONAVIRUS MAKERS

2.1. INNOVATION COMMUNITIES

In the 1990s, the concept of "community of practice" was introduced into the world of innovation. It is a concept associated with the knowledge economy and the recognition of the strategic importance of collective learning processes in organizations of any kind, beyond manufacturing companies or digital technology development environments. It may have, for example, applications in the educational world. It is based on a group of people who have a common interest centre and is, de facto, a professional learning strategy to the extent that it connects people, gives them a context, facilitates dialogue, stimulates learning, shares knowledge, develops collaborative processes and generates new knowledge that can lead to innovations.

A concept related to the community of practice is that of the innovation community. In the words of Lakhani (2016), it is formed from groups of individuals who sign up to share a technology or certain conditions of use thereof. They connect with each other (either online or in person) and are willing to share with other members of the community, altruistically, the problems and solutions relating to the different conditions of use of common technology. When it comes to specific results, the community takes responsibility not only for sharing but for obtaining a collective result that is specified in some type of operational solution (Figure 1).

It is in this context that we must place the "maker" movement, which was consolidated during the second decade of this century. The maker concept is associated with "Do It Yourself" technologies and communities of innovators, multidisciplinary profiles, who propose to solve local challenges or needs from an open source approach, in which knowledge is shared that is generated and there are no property rights. This movement is usually identified with so-called new technologies, especially 3D manufacturing but also laser cutters, sensors, etc. In fact, the development in the last twenty years of internet-based communications and the growing digitization of knowledge-intensive tasks has demonstrated the feasibility of solving problems through "crowds". The creation of makers' communities has obviously benefited from this fact.

Market failures can motivate users to become innovators and, when they possess the required capabilities, it may be more rational for them to carry out innovation rather than outsource it to manufacturers. The Innovation Community makes sense to its members if they believe that by performing the activity themselves they can save on transaction costs. That is, the self-organization and integration associated with the activity give a better result than what would be obtained by carrying out a market transaction. In general, a community is created in a market where transaction costs are high for consumers/users or users have an advantage over the cost of organizing a particular activity (for example users own knowledge inputs that are valuable to the activity) and have unique resources to carry out the activity in a very competitive way. In any case these costs are saved but tracking costs are required.

The community is attractive to its members if they perceive a rate of return on their investment (time/money) that is at least as high as it would be in alternative uses or "benefits" that would be more expensive to obtain in other environments. For example: learning, having fun, or having a status or social recognition because you are a member of the community. This membership is often the only or most efficient way to obtain these "benefits". In the case of the

Coronavirus Makers network, the social component of motivation is very relevant since the activities carried out by the network aim to contribute to a health emergency.

Figure 1. The sense of belonging to an innovative community "maker"
Source: From Von Hippel, (1994), Lakhani (2016) and (Fauchard and Foray, 2016)

In a hyperconnected society it is easy for makers to detect other people with a similar or complementary profile, organize groups and share ideas. They form communities in which members work on their project, but also devote time to solving problems of other makers working on related issues. It should be noted that, complementary, in the world of communities another option has increased considerably, that of the design and execution of a challenge (through some kind of competition). Our case will take care of the first option.

We have associated makers with the concept of "innovation community" but, in addition to the practice communities to which we have referred, in literature there are a wide range of similar concepts that compete in terms of the analysis and understanding of makers communities: knowledge networks, knowledge communities, communities of interest, creative communities, epistemic communities , innovation communities, etc. (Giusti et al., 2020). The activities of the makers are often associated with the concept of "social innovation", connect with the concept of citizen creativity and are usually included, by their nature, within the framework of approaches related to the circular economy. These concepts include approaches based on virtual platforms, but also local communities located in specific physical spaces. Its character may be temporary or stable and may or may not have links with companies and institutions in "cluster" format. There is no doubt that the most important development of this innovative community/practice community approach has been the development of programmer open source software and subsequently the FabLab movement. The latter case is clearly associated with the name "makers".

2.2. THE BIRTH OF THE NETWORK

The Coronavirus Makers network defines itself as: "the largest network of experts in open and free technology, *open source*, which was set up in March 2020 by volunteers with the aim of creating emergency support material". On the web the slogan of support is, "Open source to live". The network is made up of makers, who respond to requests received from the health sector from the "health care" section of the website. At the same time, contributions are made from all kinds of support entities in very diverse modalities: financial donations, helping in some part of the manufacturing process, buying or contributing material, distributing etc.

The range of products is wide, with different levels of technological complexity, although the largest part of the production has been made in uncomplex products: visors, ears strap extender and doors openers. Within the enormous diversity of agents and organizations participating in the network, there have also been advanced profile groups that have worked on initiatives aimed at the development of an open source respirator[1].

The Figure 2 shows different milestones that occurred during the first month of operation of the network and that help to understand the evolution that the project has followed. This initial stage was extremely intensive in activity taking into account the equipment needs that arose in the hospitals, the need to create working groups that fed back to each other, to share the first designs and start producing etc...

1. For reasons of space and for the unique characteristics of respirator projects we will not deal with these initiatives in this document. It should be noted among them that prepared by the Asturian group "Reesistencia Team".

March 12th. Tweet by Jorge Barrero (Cotec Foundation) announcing the creation of a Whatsapp group of doctors, engineers, entrepreneurs and makers to think of cheap and fast solutions for patient ventilation.

March 13th. Tweet from Esther Borao, director of the Instituto Tecnológico de Aragón, where he announces the creation of a group in Telegram to exchange information and raise the possibility of manufacturing basic personal protective equipment -the famous PPE- in printers 3D.

March 14th. The basic infrastructure is being developed and the first steps are being taken. The website www.coronavirusmakers.org is created. The main Telegram group https://t.me/coronavirus_makers emerges and the forum https://foro.coronavirusmakers.org is implemented to collect the documentation of prototypes and technical solutions.

March 15th. Esther Borao announces on her Twitter account that there are already 900 makers coordinating on Telegram. Meanwhile, the first statistics on the use of the forum began to be published in the daily activity summary minutes: The forum, after one day of operation, has the following records: 115 Registered, 65 Post, 32 Presentations, 7 Prototype summaries, 1 Mask. Daily summary. It is urged to actively participate in the forum.

March 16-18.

- Increase in forum participants. Numerous professionals in the fields of bio-engineering, 3D printing and graphic design join the project. Doctors and medical students at Master-s level are also included.
- Advances in research and development of prototypes. The community is urged to create and launch new projects.
- The advances in the prototyping of rigid masks / visors materialize.
- The Resistance group finishes its first prototype and performs the first tests of its breathing aids / fan.
- Different challenges are launched based on the recommendations of the medical team participating in the community. For example, the development of: capnographs, printed mapleson, printed ambu and fan filters, among others.

March 19-20.

- Promotion of regional groups as points of contact: manufacturing and carrying out R&D.
- Work begins on the creation of the national register of 3D printers.
- The management of logistics tasks is carried out by companies in the sector and in coordination with the local police.
- Visors are starting to arrive at health centers. The Extremadura team has printed 160 visors.

March 24th.

- Regional visor manufacturing groups are maximally producing and delivering in different hospitals.
- The "Reesistencia team "continues to work against the clock in Asturias, launching its prototype for validation.
- The main group exceeds 13500 members and there are beginning to be groups in other countries to replicate the initiative.
- Various media have echoed this community and the solidarity work that is being carried out.

March 30. Census of machines recorded 17 days after boot.

March 31. Arduino, the hardware, software, and free documentation project announces an open conference on practical solutions for Covid-19 with specialized tracks on scaling up the manufacture of digital systems, legal aspects, breathing aids/ fans and devices of any kind.

April 07. Meeting to evaluate the constitution of the movement in a non-profit association.

April 9.

- The Universitat Oberta de Catalunya organizes a Webminar to help coordination between new makers.
- Launch of the map of "Makers" against COVID-19

April 11. Ashoka's collaboration for the management of donations. Debate on the management of material resources.

Figure 2. Milestones in the history of Coronavirus Makers 2020 (the first month of the network)
Source: Own elaboration from CoronavirusMakers.Foro CoronavirusMakers (A.I.RE.). Category, Organization.
https://vanilla.coronavirusmakers.org/index.php?p=/categories/organizaci%C3%B3n

3. THE CORONAVIRUS MAKERS COMMUNITY: ORGANIZATION AND LOGISTICS

3.1. VIRTUAL AND COLLABORATIVE ORGANIZATION

Communities democratize innovation by aggregating the inputs of the different participants in order to address a particular problem in a shared way. The advantage of the community's approach is that not all its members have to solve all the problems posed by a certain technology, but tasks are distributed. The different members solve micro-problems or local problems and then share it with the rest of the community. In short, communities serve to address innovation problems in which individuals (members) focus on specialising in specific areas so that value is generated by aggregating collective work.

Virtual organizations are defined as a group of geographically dispersed individuals or groups, agile, temporary or permanently associated, that pursue a common goal, and that communicate, coordinate and produce through the use of technologies (Ahuja and Carley, 1999; Meléndez, Obra and Rosa, 2003; Camarinha-Matos, 2007; Serrano and Fischer, 2007). They are characterized by informal communication through the use of information technologies, such as virtual meetings, email or messaging services,

due to the absence of a physical space shared among members and by the lack of organizational routines (or these are non-routine activities) and challenges in resource management (Ahuja and Carley, 1999).

One of the great challenges of a community is the need to coordinate and integrate the efforts of its members. Since there is no conventional contractual relationship, and members are geographically distributed, the design of the structure (architecture) is very important for integration to work. Baldwin and Clark (2006) demonstrated that architecture can replace coordination and that the performance of the set is more based on the fact that everyone does what is right for them and there is some kind of coordination in the community center that accepts or rejects the contributions made by the different members. From an organizational point of view, we will illustrate the Coronavirus Makers movement as an innovation community, structured from a collaborative network (Camarinha-Matos, 2007). In this case it is, within the framework of the pandemic, a virtual network. This nuance is important because in its origins, in Spain, the term maker is usually associated with groups organized from a shared physical space that is the reference point of their activities.

3.2. THE ORGANIZATION OF CORONAVIRUS MAKERS

The network began to join efforts and work for the common goal of creating emergency aid sanitary material. This collaborative work of mass design and production involved the development of prototypes with different levels of technological complexity. Using open source and 3D printers, the collaborative virtual organization involved more than 20,000 people, from all over Spain and other countries, and managed to distribute more than two million units in just over 2 months. Understanding the organization of the network is certainly one of the most interesting aspects of this case.

The organization in collaborative virtual communities revolves around communication between its members, through its technological architecture. In the specific case of the Coronavirus

Makers community, different participation platforms were developed (Figure 3). On the one hand, a web platform was developed integrated by the main page of the project, which serves, among other things, to detail what coronavirus makers are and what it does; in addition, the forum has been used as a means of collaboration. Likewise, accounts were created in the main social networks in order to promote the dissemination of the initiative. Finally, it is worth mentioning the Telegram instant messaging system. This instant messaging tool has become the main architecture of organization, management and communication of the community. For this reason, we will delve into more detail about the structuring of this complex network of information channels.

Telegram	Main group @coronavirus_makers Bot @coronavirusmakers_bot Grups de treball temàtics Grups de treball geogràfics
Web	Main page of the project https://word.coronavirusmakers.org/ Collaboration platform (forum) https://foro.coronavirusmakers.org/
Twitter/Facebook / Instagram	Accounts for the dissemination of the movement Twitter:@coronavirus Mak Facebook: @coronavirusMak3 Instagram:coronavirus_makers
Github	Link to Git with designs https://gitlab.com/coronavirusmakers/recursos

Figure 3. Main collaboration platforms Coronavirus Makers
Source: Own elaboration from Telegram.

From Telegram it is possible to identify the organizational structure of the Coronavirus makers community. Two basic levels of coordination were formed: national and regional. National coordination assumes strategic and organizational functions,

including research references, location of action groups and distribution of tasks. For their part, regional coordination and technical groups are more operational territorial nodes at the provincial and local level.

From the main group (@coronavirus_makers) new members are welcomed and, at the same time, they are introduced to the community by sharing their main resources, particularly the bot (@coronavirusmakers_bot; communication interface). This resource contains all links to Telegram working groups and groups by country and region worldwide. Within the bot, all the information relating to collaboration platforms is confirmed. In addition, the two main working groups within the structure are made clear: by subject and by geographical Distribution. The thematic working groups are focused on seven specific areas: design, electronics, EPIs (Individual Protection Equipment), instrumentation, kids, general resources and software (Figure 4).

Design	Group for the generation of ideas prior to the development of a specific work. Ideas before you create the group.
Electronic	For electronic hardware and firmware of devices that may be useful
EPI	Grips Helmets/helmets CV19makers diffusion _EPI screen CV19makers_ filters mask Glasses Visors and screens
Instrumentation	Capnograph/ meter
Kids	CV19 Makers_anuncis CV19 Solidarity Recycling of 3D material Solidarity Solutions

General resources	CV19 Makers_anuncis CV19 Solidari Reciclatge de material 3D Solucions solidàries
Programari	

Figure 4. Telegram: Thematic working groups

Source: Own elaboration from the Main Group of Coronavirus Makers in Telegram (@coronavirus_makers)

For their part, regional nodes are organized into local nodes depending on the projects in order to gain efficiency (Figure 5). They are responsible for executing the production and distributing the materials.

Andalusia (11) Aragon (3) Principality of Asturias (7) Canary Islands (8) Cantabria Castilla La Mancha (3) Castile and Leon (10)	Catalonia (15) Extremadura Galicia Balearic Islands La Rioja (2) Community of Madrid (32)	Region of Murcia (2) Regional Community of Navarra Basque Country Valencian Community Ceuta Melilla

Figure 5. Telegram: Geographical working groups*

* By autonomous communities and the autonomous cities of Ceuta and Melilla

Each node developed within the platform a bot that makes it possible to organize and manage the processes of digital design and logistics. This communication architecture allows nodes, on the one hand, to register 3D printers, share requests for material (acetates, plastics, rubbers, etc.) and manage the inventory produced by volunteers, as well as the programming of the collection and delivery of finished pieces (Figure 6).

Register a new printer
Register new printed pieces
Asking for material, I'm running out
Mark material as delivered to delivery man
Request collection

Figure 6. The computer application of the basic operations of the nodes
Source: Own elaboration from the Bot of Coronavirus Makers to Telegram (@coronavirusmakers_bot).

As mentioned above, the initiative was supported by associations, companies, foundations of all kinds, with very varied support or participation roles. Among hundreds of organizations, some examples can be mentioned: FabLab León, Makespace Madrid, Tecnalia (Bizkaia Science and Technology Park), Cotec Foundation, CovidWarriors, ITAINNOVA (Aragon), MujeresTech, Arduino, Startupexplore, ONCE Social Group, Ashoka, Zalando, etc. That is, associations of makers, digital manufacturing centres linked to the public sector, universities, associations supporting entrepreneurship and innovation, technology centres, large companies, etc. In Barcelona, the five "ateneus" of digital manufacturing of the city, of a municipal nature, stopped their dissemination and training activity related to digital manufacturing to lead working groups and devote themselves intensively to manufacturing and exercising logistic centres. Similar situations occurred throughout Spain to build the nodes of the network.

3.3. THE DIGITAL MANUFACTURING AND LOGISTICS

Virtual organizations are associated with collaborative innovation processes, which describes the structured joint processes – for the design and development of new products, services or processes – that require shared information, planning and problem solving as a whole, as well as integrated operations (Serrano and Fischer, 2007). Below, two key processes within the network are described: digital manufacturing and the distribution process.

3.3.1. Design and 3D printing

Digital manufacturing is the set of integrated processes through which a physical product is created from a digital model. In the digital design phase a model is developed with computer-aided design programs (CAD), a simulation is performed to finally move to 3D printing. In the case that concerns us, these activities are performed through Telegram thematic groups.

Digital designs are available in a cloud (github, see Figure 3) or are distributed through technical channels on Telegram. There are working groups specialized in the development of new designs or improvements to existing ones. The models are designed and adjusted depending on the knowledge generated through the insights of the makers. The improvements are incorporated into the new versions available to all members.

It is important to mention that there are two levels of validation of the designs depending on whether the project requires health approval or not. Designs that do not require health approval are validated by community members, who provide points of improvement, discuss improvements and are disseminated through the corresponding channels. Usually among regional technical groups.

The designs that require to be validated follow the same elaboration procedure, however, before moving on to mass production, go through the different regional health administrations. The most representative case of this option is that of the Breathing aids deviced[2]. The need for authorization and the technological complexity of the product mean that only a small part of the network work on this topic that requires many interactions with other organizations. For obvious reasons, it is much more productive in the short term to prioritize the design and manufacture of less technologically complex PPEs.

2. As an example, the following reference can be consulted: CoronavirusMakers. Prototypes. https://vanilla.coronavirusmakers.org/index.php?p=/categories/prototipos

For 3D Printing FDM (Fused Deposition Modelling), regional manufacturing technical groups focus on the correct calibration of 3D printers and the management of the production of sanitary material. The steps to take are as follows[3]:

1. *Join the group*. It is necessary to fill in a questionnaire to assess the availability of the new member. This form collects information about: Telegram user, type of contribution (design and / or production of parts), level of commitment and availability of time for production and / or logistics activities and if you have a relationship with someone to help detect needs.

2. *Calibration of tolerances*. The next step is to set up the 3D printing equipment. To do this it is necessary to perform the horizontal expansion tests. Depending on availability, each regional / local node provides the material to perform the test.

3. *Register the 3D printer.* Once the test is done, the printer must be registered using the bot. Personal data and technical specifications of the printer will be requested.

4. *Printing the pieces*. Depending on the situation and resources, makers can print fully assembled parts or, in other cases, print the components of the piece independently and refer them to assembly and disinfection logistics centres (FabLab, for example CV19_FAB_ Catalunya).

5. *Disinfection of the parts*. After printing, each piece must be disinfected following the protocol proposed by the community. It is recommended to use two different types of disinfectants: bleach dissolved in 0.5% water or alcohol 96º dissolved in 70% water. To apply the disinfectant solution (i) the piece is submerged for one minute, (ii) it is placed in a bag that meets predetermined specifications (iii) it is delivered to the authorized person in charge of the locality.

3. It is important to bear in mind that Coronavirus Makers is a dynamic and lively movement. Since the beginning and during our case preparation tasks (May-June, 2020), the community has undergone major organizational and operational transformations. We warn the reader that some of the digital documents, Telegram channels, web pages, etc., have been closed. Some reasons for this are: the reduction of activity and the centralization processes of activities at a more local level. (Explanatory note drafted at the time of publication of the case, September 2020).

3.3.2. The logistical challenge of Coronavirus Makers.

One of the main achievements of the Coronavirus Makers network has been the transition from individual to collective manufacturing. Once all the material has been made, the most important challenge is to distribute it to the centres and people who will use it. Logistics management in each region is decentralized and has its own characteristics, however, there are similar processes that involve the management of resources or the transport of materials. To illustrate the procedure, the process in Catalonia is described below.

In the case of Catalonia, resource management was done through the bot @ CV19_bot (Figure 7), designed specifically for Catalan coordination. Its main features include:

- *Resource management.* The stocks of manufactured parts and the request of materials are controlled. This last point is especially sensitive, as the delivery of material is associated with three conditions (i) indicate the name and telephone number inside the bags of the pieces, (ii) printing of masks following the parameters of the dossier (iii) to request the material using the bot.
- *Collection of manufactured parts.* Collection can be scheduled from a minimum volume of manufactured parts. After registering the manufactured parts the carriers contact the makers for their collection. Due to organizational issues, it may take a few days to collect the material.

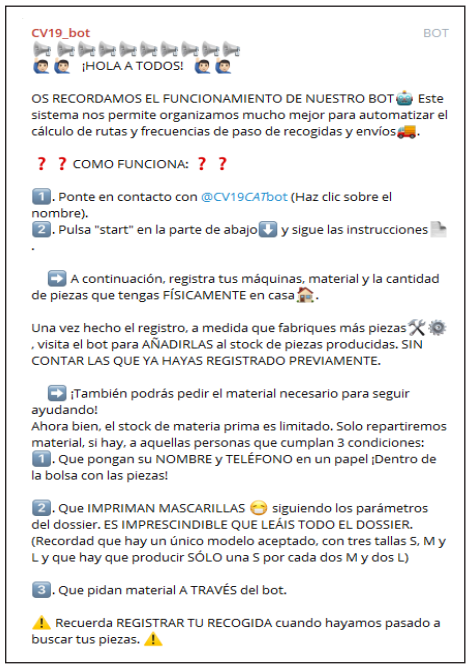

Figure 7. Telegram message on the collection of manufactured PPE.

Source: Telegram, (2020). CV19_FAB_CATALUÑA. [Message capture]. Retrieved from: t.me/cv19cataluna on April 8.

Figure 8 represents the process from manufacturing to distribution.

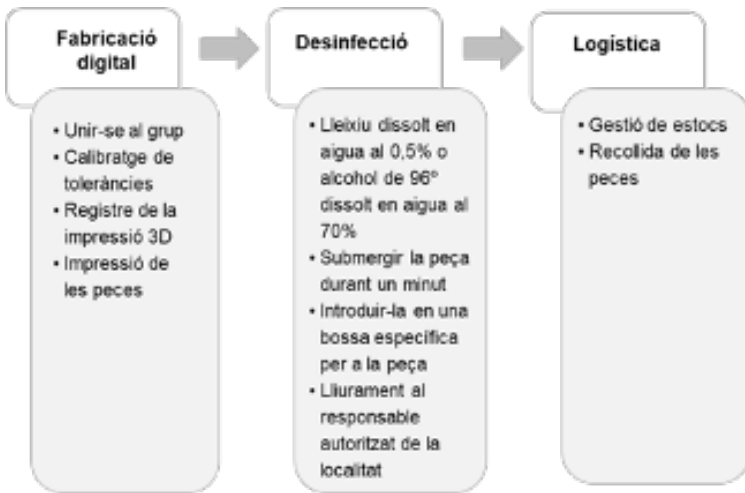

Figure 8. From manufacturing to distribution of PPE
Source: Own elaboration from Telegram.

On May 18, 2020, the network announced on its website that the estimated number of pieces of medical supplies delivered had already exceeded 2 million units (visors, ears strap extender, doors openers, bells, masks and gowns). The first three products are, very obviously, those that have reached a larger volume of manufacture. They are, in fact, products, which are used to advertise production data made by the network. Figure 9 shows the data of the production made and supplied at the time of closing this case study.

Product	Face shield mask	Ear Strap Extender	Door opener
Units	992409	373956	134784

Figure 9. Healthcare equipment produced by Coronavirus Makers (June 2020)
Source: www.coronavirusmakers.org 9/6/20

4. THE FUTURE OF CORONAVIRUS MAKERS

The coronavirus began to decrease significantly to Spain during the month of June 2020. Although the virus is still present in the country, the reduction in its aggressiveness led to a clear decrease in the activity of the Coronavirus Makers network. We don't know what will happen in the future. These four intensive months of work have been for the makers an extraordinary and unrepeatable experience of cooperation and social commitment. In this section we focus on three aspects of the network: the motivations of makers, the future challenges of the organization and the connection between the activities of this innovation community and the goals of sustainable development.

4.1. ON THE MOTIVATIONS OF MAKERS

In private enterprise, innovation is structured within the framework of a certain organizational and planned process in which objectives are set and tasks are assigned. Workers who are part of the unit developing an innovation are expected to have the necessary skills and abilities, but also to be motivated for a process that has risk and uncertainty.

In contrast, a core element of the community is the fact that participants decide the task they want to work on and how intensely they will develop it. There is no one who plays an intermediate role between the task and the "problem solver", this fact mitigates the situation of information asymmetry that exists in a company between the manager and the worker since the worker has the skills to lead to the task is completed and the manager determines the type of incentives it offers to carry out the innovative project. In the community, it is the participants who decide for themselves whether they have the set of skills and interests relevant enough to contribute to a given collective project. The most successful participants are usually related to the fact that the individual has chosen tasks and areas of work that he considered interesting or that he saw as a "challenge".

As the project evolves, the nature of the challenges to be solved becomes more evident to community members. The specific groups of knowledge and expertise, the different skills and techniques that the members of the community possess to contribute to the collective project are made visible. The decentralized nature encourages individuals to decide and do specific tasks that they deem appropriate for them without having to go through allocation mechanisms decided by community leadership. To the extent that the choice of task is free, the motivation to perform it reflects the priorities and convictions of the individual.

Some studies on motivations for participation in communities classify them as intrinsic and extrinsic. Intrinsic can be associated with having a good time in the project, stimulating the intellectual challenge or the satisfaction of completing the task. Extrinsic can be direct, such as receiving some kind of remuneration or incentive for

participation, or also for being in direct contact with a real need of the user (Lakhani, 2016). There are also indirect extrinsic motivations, such as the impact of community membership on the career or simply improvements in "learning by doing" skills.

In the case of Coronavirus Makers, both types of motivations are combined, but the importance of carrying out an activity with an immediate impact on health prevention in times of pandemic seems very relevant to understanding the extraordinary size of the network and its responsiveness. The maker culture is associated with the satisfaction derived from "doing" which in this case has a goal of obvious social impact which, at the same time, feeds the incentives to continue "manufacturing" as long as necessary from the condition of voluntary and unpaid activity (Figure 10).

Figure 10. A volunteer Organization
Source: Telegram, (2020). Press releases CV19_FAB_Barcelona [Message capture]. Retrieved from: t.me/cv19cataluna on March 22.

4.2. A REFLECTION ON ORGANIZATION AND FUTURE CHALLENGES

Figure 10 allows us to link this reflection on motivations with that of the future of the organization. Indeed, the voluntary nature of its members and the informal nature by definition of an innovative community clash with the idea of somehow "consolidating" a certain network structure.

Given the nature of innovation communities, Coronavirus Makers face important challenges that are associated with their "Open Access" vision and the organizational needs of the community; to the complexity in the management of collective capacities, strategic partnerships and resource management. After this demonstration of the power of collective mobilization, the network faces different challenges in its few months of life:

Long-term vision. The members of the network plan to maintain the movement permanently, under the figure of a non-profit association[4].

Group management. The increase in makers has made the amount of information in some groups difficult to manage. It is symptomatic of this fact a Telegram message with the statement: "Let's try to decongest this group and divide! Divide and you will win! New nodes are being made by the organizers themselves more locally, join the group in your area. Thanks and cheers".

Logistical needs. Over time, and the increase in production, the transportation of materials became one of the main needs of the network. In the case of Catalonia, this was especially relevant, for example, in the most remote areas of the Barcelona Metropolitan Area.

Legal aspects. Approval tests and insurance for clinical tests. Once the level of urgency has dropped, it is necessary to rethink whether it makes sense to collaborate in the development of certain complex products that maybe need to be developed by more stable organizations that can manage the legal aspects of products in a more structured way.

Economic aspects. The way to manage donations received by individuals and companies is another aspect to assess and decide.

The evolution of the characteristics of demand. The dynamic and agile nature of the project makes its challenges to change as it evolves. If at the beginning the first major challenge was to make sanitary material, now manufacturers are facing the challenge of making material to isolate and make spaces safer. This is the case, for example, of the manufacture and distribution of insulating screens for health centres.

4. They say they are working on the draft statutes (April 22nd, 2020).

4.3. INNOVATION COMMUNITIES AND SUSTAINABLE DEVELOPMENT GOALS

The activities of the network clearly connect with the Sustainable Development Goals (SDGs). Indeed, SDG No. 3 refers to "Health and Wellness." It is about the common work of the different actors involved and the policies of governments contributing to an essential theme for sustainable development: ensuring a healthy life and promoting well-being at all ages. The Covid-19 health crisis has had a drastic impact on the health and well-being of the population and has generated huge resource needs for health systems to cope with the pandemic.

It is in this context, and under the motto "Protecting those who protect us", that Coronavirus Makers began to pool efforts and work for the common goal of creating health aid material for emergencies. It was about contributing to risk reduction and risk management for the country's health (SDG 3.e) by focusing on the production of basic protective equipment for the health system of which at that time there was no a sufficient supply.

Additionally, the network's activity is by an innovative nature and contributes to the efficient use of resources in line with the guidelines of the sustainable development goal number 9 that refers to "industry, innovation and infrastructure". As stated on the official SDG platform, information and communication technologies have been at the fore front line of the response to COVID-19. The crisis has accelerated the digitization of many businesses and services. Its objective 9.5 highlights the importance of increasing scientific research and improving the technological capacity of the industrial sectors of all countries, encouraging innovation.

BIBLIOGRAPHY REFERENCES

- Ahuja, M. K. and Carley, K. M. (1999) 'Network Structure in Virtual Organizations', Organization Science, 10(6), pp. 741–757.
- Camarinha-Matos, L. M. (2007) 'Collaborative networked organizations in manufacturing', IFAC Proceedings Volumes (IFAC-PapersOnline), 1(PART 1), pp. 187–198.
- Fauchart, E., Foray, D. (2016) "On the democratization of innovation through communal organizations" en Harthoff, D. and Lakhani, K.R. (Eds.) "Revolutionizing innovation: users, communities and open innovation" pp.175-194. MIT Press.
- Giusti, J.D., Alberti, F.G., and Belfanti, A. (2018). "Makers and clusters. Knowledge leaks in open innovation networks. Journal of Innovation and Knowledge, Vol.5 , pp. 20-28.
- Lakhani, K.R.(2016) "Managing communities and contests to innovate with crowds" en Harthoff, D. and Lakhani, K.R. (Eds.) "Revolutionizing innovation: users, communities and open innovation". pp 109-134. MIT Press.
- Meléndez, P., Obra, Á. and Rosa, A. (2003). "La evolución de las formas organizativas. De la estructura simple a la organización en red y virtual. Investigaciones Europeas de Dirección y Economía de la Empresa, 9(1994), pp. 69–94.
- Serrano, V. and Fischer, T. (2007) 'Collaborative innovation in ubiquitous systems', Journal of Intelligent Manufacturing, 18(5), pp. 599–615.
- Von Hippel, E. (1994) "Sticky information and the locus of problema solving: implications for innovation" Management Science 40 /4): 429.39

To obtain the Teaching note please contact with:

Esther Hormiga
ehormiga@ub.edu

Jaume Valls
jaume.valls@ub.edu

Collaborating entities